REMARKS

1.   In response to the Office Action mailed January 31, 2008, Applicants respectfully request reconsideration.   Claims 1-7, 9-11 and 13 were last presented for examination.   In the outstanding Office Action, all claims are rejected.   In this paper, claims 1-7, 9-11 and 13 have been amended, claims 14-21 have been added and no claims have been cancelled.   Thus, upon entry of this paper, claims 1-7, 9-11 and 13-21 will be pending in this application.   Of these nineteen (19) claims, three (3) claims (claims 1, 9, and 16) are independent.

2.   Based upon the above Amendments and following Remarks, Applicants respectfully request that all outstanding objections and rejections be reconsidered, and that they be withdrawn.

Art of Record

3.   Applicants acknowledge receipt of form PTO-892 listing additional references identified by the Examiner.

4.   Applicants thank the Examiner for return of form PTO/SB/08b filed by Applicants on March 10, 2006, which has been initialed by the Examiner indicating consideration of the references cited therein.

Foreign Priority

5.   Applicants note with appreciation the Examiner's acknowledgement of foreign priority under 35 U.S.C. §119.

6.   Applicants note with appreciation Examiner's acknowledgement of receipt of certified copies of the priority documents.

Drawings

7.   The Examiner has failed to indicate whether the drawings have been accepted for publication. Applicants respectfully request that the Examiner indicate in the next official action that the drawings have been accepted by the Examiner.

Claim Amendments

8.   By the foregoing Amendments, Applicants have amended claims 1-7, 9-11 and 13 to make the claims more readable. Applicants submit that these amendments have not been made in response to any objections or rejections. Applicants further submit that the above Amendments do not narrow the scope of the claims and that no new matter has been added.

Claim Rejections under 35 U.S.C. §102

9.   The Examiner has rejected claims 1-2, 5-7, 9 and 11 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 7,206,418 to Yang *et al.*, (hereinafter, "Yang"). For at least the reasons discussed below, Applicants respectfully disagree.

Claim 1

10.   Applicants assert that Yang fails to teach or suggest all elements of Applicants' invention as recited in claim 1. Specifically, Applicants assert that Yang fails to teach "applying a filtering operation to said at least one noise reference signal... whereby said filtering operation... is performed with one or more filters *having filter coefficients configured to minimize a weighted sum of the speech distortion energy and the residual noise energy in said output version of said speech signal*" as recited, in part, in Applicants' claim 1. (Emphasis added.)

11.   Yang is directed to a wireless communication device having noise suppression capabilities. (*See*, Yang, col. 1, lns. 6-10.) In Yang, two or more microphones "are used to detect respective signals. Each detected signal comprises a desired speech component and an undesired noise component." (*See*, Yang, col. 2, lns. 14-29.) A signal processor then processes these detected signals to generate a "desired output signal having predominately speech, with a large portion of the noise removed." (*See*, Yang, col. 2, lns. 14-29.)

12.   More specifically, the detected signals of Yang are provided to first and second beam forming units. (*See*, Yang, col. 2, lns. 30-53.) The "first beam forming unit receives and processes the detected signals to provide a first signal s(t) having the desired component [of the detected signal] plus a portion of the undesired component." (*See*, Yang, col. 2, lns. 30-53.) The "second beam forming unit receives and processes the detected signals to provide a second signal x(t) having a large portion of the undesired component [of the detected signal]." (*See*, Yang, col.

2, lns. 30-53.) These two signals (s(t) and x(t)) are then provided to a noise suppression unit for further processing. (*See*, Yang, col. 2, lns. 30-53.)

13.   In a first embodiment of Yang illustrated in Figure 2, the noise suppression unit (230a) includes a noise spectrum estimator, a transformer, a gain calculation unit and a multiplier. (*See*, Yang, col. 2, lns. 54-65.) In this embodiment, the noise spectrum estimator derives an estimate of the spectrum of the noise within the detected signals from the second signal x(t). (*See*, Yang, col. 2, lns. 54-65.) The transformer uses a fast Fourier transform to convert the first signal s(t) from the time domain into the frequency domain. (*See*, Yang, col. 7, lns. 16-44.) The estimate of the noise spectrum and the transformed version of first signal s(t) are provided to a gain calculation unit. (*See*, Yang, col. 2, lns. 54-65.) The gain calculation unit then generates a set of gain coefficients for a multiplier based on the estimate of the noise spectrum and the transformed version of first signal s(t). (*See*, Yang, col. 2, lns. 54-65.) The multiplier then scales the transformed version of first signal s(t) by the gain coefficients. (*See*, Yang, col. 2, lns. 54-65.) This scaled signal is then "inverse transformed to provide the output signal." (*See*, Yang, col. 2, lns. 54-65.)

14.   Yang further includes several additional embodiments which are all similar to this first embodiment of Figure 2. (*See*, Yang, FIGS. 5 and 6.) Specifically, these embodiments all include a noise spectrum estimator, transformer and a gain calculator to generate an output signal. (*See*, Yang, FIGS. 5 and 6.) In these embodiments of Yang, the noise suppression units do not include any type of filters. (*See*, Yang, FIGS. 2, 5 and 6.)

15.   In a second alternative embodiment of Yang illustrated in Figure 4, the noise suppression unit (230b) comprises a pre-filter, voice activity detector, adaptive filter, summer and spectrum subtraction unit. (*See*, Yang, col. 9, lns. 40-49; Figure 4.) In this embodiment, the first signal s(t) is provided to the pre-filter to remove high frequency components, and this filtered version of s(t) is provided to the summer. (*See*, Yang, col. 9, lns. 40-49.) The second signal x(t) is provided to the adaptive filter which filters x(t) with a particular transfer function h(t). (*See*, Yang, col. 9, lns. 40-49.) The filtered version of x(t) is subtracted from filtered version of s(t) "to provide an intermediate signal d(t) having predominately speech and some amount of noise." (*See*, Yang, col. 9, lns. 40-49.) Intermediate signal d(t) is then provided to the spectrum

10

subtraction unit. (*See*, Yang, col. 10, lns. 19-34.) Spectrum subtraction unit is "implemented as described above for noise suppression unit 230a." (*See*, Yang, col. 10, lns. 19-34.)

16.   Although Yang teaches basic filtering of signals during a noise suppresion process, Applicants assert that the filtering of Wang is not analogous to a "filtering operation" recited above in claim 1. As explained above, the filters of Yang are used to filter the input signal into first and second signals, to filter out high frequency components, or merely to apply a transfer function to a signal. (*See*, Yang, col. 9, lns. 40-49.) One of ordinary skill in the art would not consider these filtering operations of Yang as equivalent to "a filtering operation... [of] at least one noise reference signal... whereby said filtering operation... is performed with one or more filters *having filter coefficients configured to minimize a weighted sum of the speech distortion energy and the residual noise energy in said output version of said speech signal*" as recited in Applicants' claim 1. (Emphasis added.) Not only is Yang silent as to minimizing " a weighted sum of the speech distortion energy and the residual noise energy" in the output, but Wang is further completely silent as to the use of speech distortion energy and the residual noise energy in any manner whatsoever. (*See*, Applicants' claim 1, above.)

17.   Applicants further assert that the other art of record, taken alone or in combination, fail to teach or suggest that which is missing from Yang. Therefore, for at least these reasons, Applicants assert that Wang fails to teach or suggest all elements of Applicants' claim 1. As such, Applicants respectfully request that the rejection of claim 1 under 35 U.S.C. §102 be reconsidered, and that it be withdrawn.

Claim 9

18.   Applicants' claim 9 is directed to a "signal processor for reducing noise in a speech signal." (*See*, Applicants' claim 9, above.) The signal processor of Applicants' claim 9 comprises "a second filter configured to filter said at least one noise reference signal...wherein said second filter has filter coefficients configured to minimize a weighted sum of the energy of said speech leakage contribution and the energy of said noise contributions in said output version of said speech signal." (*See*, Applicants' claim 9, above.) For at least the reasons discussed above with reference to claim 1, Applicants assert that Yang fails to teach at least these elements of claim 9. Specifically, as noted above, the filters of Yang are merely used to initially filter an

input signal into multiple components, filter out high frequency components, or to apply a
transfer function to a signal, and completely fail "to minimize a weighted sum of the energy of
said speech leakage contribution and the energy of said noise contributions" as recited in claim 9,
above. (*See*, Yang, col. 9, lns. 40-49.) As such, for at least these reasons, Applicants
respectfully request that the rejection of claim 9 under 35 U.S.C. §102 be reconsidered, and that
it be withdrawn.

Claim Rejections under 35 U.S.C. 103(a)

19.   Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yang in view of
U.S. Patent No. 6,178,248 to Marsh, (hereinafter, "Marsh"). The Examiner has also rejected
claims 3-4 and 10 under 35 U.S.C. 103(a) as being unpatentable over Yang in view of U.S.
Patent No. 6,449,586 to Hoshuyama, (hereinafter, "Hoshuyama"). Without addressing the
apparent lack of motivation to combine Yang with Marsh or Hoshuyama, Applicants respectfully
assert that the above rejections of Applicants' claims are improper for at least the reason that the
proposed combinations fail to teach or suggest all elements of claims 3-4, 10 and 13,
respectively.

20.   As noted above with reference to the rejections of claims 1 and 9 under 35 U.S.C. §102,
Yang fails to teach or suggest that which the Examiner asserts. Specifically, Yang fails to teach
or suggest "filter coefficients configured to minimize a weighted sum of the speech distortion
energy and the residual noise energy in said output version of said speech signal" as recited, in
part, in Applicants' claim 1, or a "second filter… [having] filter coefficients configured to
minimize a weighted sum of the energy of said speech leakage contribution and the energy of
said noise contributions in said output version of said speech signal" as recited, in part, in
Applicants' claim 9. Applicants further assert that neither Marsh nor Hoshuyama teach or
suggest that which is missing from Yang.

21.   Because dependent claims 3-4, 10 and 13 incorporate the subject matter of their
respective independent claims (1 or 9), Applicants assert that Yang, Marsh and Hoshuyama,
taken alone or in combination, fail to teach or suggest all elements of Applicants' claims 3-4, 10
and 13. As such, Applicants respectfully assert that the rejections under 35 U.S.C. §103 are
improper and should be withdrawn.

New Claims

22.   Applicants have added new claims 14-21 to further claim embodiments of the present invention. Support for the new claims is found in the originally filed specification and drawings. Applicants submit that these new claims have not been added to overcome any objection or rejection and respectfully submit that no new matter has been added.

Claim 16

23.   New Independent claim 16 is directed to a "signal processor configured to reduce noise in a speech signal." (*See*, Applicants' claim 16, above.) The signal processor of Applicants' claim 16 comprises "a means for filtering said at least one noise reference signal... wherein said means for filtering said at least one noise reference signal is configured to minimize a weighted sum of the energy of said speech leakage contribution and the energy of said noise contributions in said output version of said speech signal." (*See*, Applicants' claim 16, above.) For at least the reasons discussed above with reference to claim 1, Applicants assert that Yang fails to teach or suggest at least these elements of claim 16. Specifically, as noted above, the filters of Yang are merely used to initially filter an input signal into multiple components, filter out high frequency components, or to apply a transfer function to a signal, and completely fail "minimize a weighted sum of the energy of said speech leakage contribution and the energy of said noise contributions" in the output signal as recited in claim 16, above. (*See*, Yang, col. 9, lns. 40-49.) As such, Applicants respectfully assert that claim 16 is patentable over the art of record.

Dependent Claims

24.   The dependent claims incorporate all of the subject matter of their respective independent claims and add additional subject matter, which makes them *a fortiori* and independently patentable over the art of record. Accordingly, Applicant respectfully requests that the outstanding rejections of the dependent claims be reconsidered and withdrawn.

Conclusion

25.   In view of the foregoing, Applicants respectfully submit that this application is now in condition for allowance. A notice to this effect is respectfully requested.

26.   Applicants make no admissions by not addressing any outstanding rejections or basis of rejections. Furthermore, Applicants reserve the right to pursue any cancelled claims or other subject matter disclosed in this application in a continuation or divisional application. Thus, cancellations and amendments of above claims, are not to be construed as an admission regarding the patentability of any claims.

Dated: June 2, 2008   Respectfully submitted,

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